

ASTRONOMY

Plan Star Photography From High-Flying Balloon

► SCIENTISTS will try again about mid-July to photograph the stars from a manned balloon at 40,000 feet, above the bulk of the earth's atmosphere.

The aim is to find out how high man has to go in order to get sharp images of stars on photographic plates. Dr. Arthur Hoag of the U. S. Naval Observatory, Flagstaff, Ariz., is building a special telescope with which he will make these measurements, SCIENCE SERVICE learned.

The first attempt at photographing stars from above the earth's atmosphere was unsuccessful because the balloon was not sufficiently stable. Scientists hope a slower ascent rate will solve this problem. The May try yielded only qualitative information on how heavenly objects appear from very high altitudes, but the next flight is aimed at obtaining actual readings.

The May flight did, however, yield some aeromedical information. Telemetered records, now under more intensive study, indicated that one of the scientists had a change in the rate of electrical conduction from the top to the bottom of his heart when the pressure breathing equipment was turned on at about 37,000 feet. If confirmed, this suggests pressure breathing should be dispensed with at high altitudes.

Dr. Hoag's observations should settle the question of whether it is necessary to go to 40,000 feet to obtain steady stellar images or whether 20,000 feet would be enough, as some French astronomers believe. Launching a stable balloon platform for a telescope would be much less complex for the lower altitude. An airplane's vibrations make aircraft unsatisfactory for a telescope platform.

Both flights are part of the program known as Strato-lab, a project of the Navy's Office of Naval Research.

Science News Letter, June 21, 1958

ASTRONAUTICS

Space Research to Benefit Average Man at Once

► ADVANCED RESEARCH programs into space travel will have immediate benefits for the average taxpayer, even though he may not be interested in traveling to the moon.

Space research will almost immediately aid in solving automobile and air traffic problems. It may also provide the key to cheap, unlimited power as well as unlocking the secrets of today's physical and psychological ills.

These are but a few of the important by-product benefits the nation's space research program is beginning to offer the average man-in-the-street.

Even higher "fi" in high fidelity phonographs will be among the secondary fruits of space research, Robert E. Gross, chairman of the board and chief executive officer of Lockheed Aircraft Corporation, Burbank, Calif., told the first national Missile Industry Conference in Washington, D. C.

As an example of medical benefits beginning to flow from the space research program, Mr. Gross cited work being done with a giant mathematical computer at the Lockheed Missile Systems Division.

Installed primarily to aid engineers, the computer is also being used to study human behavior with respect to missile reliability. New information about heart disease already has come from the project.

In attacking the missileman's major problem, that of reliability, scientists have had to develop newer and purer materials, which already are finding their way into television equipment and phonographs.

Mr. Gross spoke at the Dr. Robert H. Goddard Memorial Dinner, honoring the nation's pioneer rocket scientist.

Dr. Wernher Von Braun was awarded the Robert H. Goddard trophy at the dinner, and the Borg-Warner trophy was awarded to the Lockheed Aircraft Corporation for its work on the Polar missile.

Science News Letter, June 21, 1958

METEOROLOGY

Definite Weather Pattern Needed for Tornadoes

► DEFINITE weather patterns are needed to spawn tornadoes, the swirling storms that swoop down from a line of thunderstorm clouds to level anything in their paths.

Whenever two large air masses—one moisture-rich and warm, the other dry and cooler—battle for supremacy, the stage is set for stormy weather.

If other factors are right, the resulting thunderstorms may give birth to a tornado's whirling funnel.

One factor is a big temperature difference between the tropical air and the colder air, such as temperatures in the high 90's ahead of the cold front, in the 60's behind it. Such a sharp cold front sets off developments in the warm air. A line of thunderstorms, or squall line, is established.

A pulse, or "pressure jump line," is sent out ahead of the squall line, most weathermen believe. The pulse sets up a vertical motion to help release the pent-up energy of the warm air.

High in the atmosphere there is often a swiftly moving jet stream, usually from the west, bringing with it drier, cooler air, that helps the tornadic conditions.

Trying to learn what the other factors are and their exact relationships is part of the Weather Bureau's research program on severe storms. In addition to meteorologists at the Weather Bureau, those at several universities and private research institutes are trying to find one or more unique features that precede tornadoes and point the way to their earlier detection.

The methods for doing this range from making miniature tornadoes in laboratory boxes to using airplanes flying into the squall lines in which twisters are formed to learn more about exact weather conditions there; from studying radar photographs of tornadoes and lightning discharges to feeding complex mathematical formulas into computers.

Science News Letter, June 21, 1958

IN SCIEN

PHARMACOLOGY

Drug Substitutes For Progesterone

► A DRUG substitute for a hormone which prevents miscarriage or premature birth has been developed.

Labeled Provera by the manufacturers, Upjohn Company, Kalamazoo, Mich., the drug acts similarly to the hormone progesterone, which helps regulate the duration of pregnancy.

It has been observed in animal tests that Provera also is a potent ovulation inhibitor, suggesting that it may prove useful as an oral contraceptive, Upjohn clinicians report in the *Journal of the American Chemical Society* (June).

The research group reports the drug was used on pregnant rats that had their ovaries removed on the eighth day of pregnancy. Provera was 25 to 100 times as potent as progesterone in maintaining pregnancy to its proper term.

Without progesterone, which is supplied by the ovaries, the uterus contracts, or goes into labor, and the fetus is expelled. The new drug has proven capable, in very small doses, of replacing natural progesterone, Dr. Jacob C. Stucki, physician specializing in endocrinology, chemists John C. Babcock, Erwin S. Gutsell, Milton E. Herr and John A. Hogg, and biologists Lester E. Barnes and William E. Dulin, report.

The chemical name of the drug is 6 alpha-methyl-17 alpha-acetoxyprogesterone. In tablet form, it was 100 to 30 times as active as ethisterone, an orally active drug similar to progesterone.

Science News Letter, June 21, 1958

AGRICULTURE

Grass Length Influences Moisture Loss From Soil

► THE KIND of grass planted in a pasture can significantly influence how much water is lost from the soil, two New Zealand scientists have found.

K. J. Mitchell and R. L. Closs of the Department of Scientific and Industrial Research studied the rate of moisture loss under varying conditions of temperature and with both long and short pasture grasses.

They found that with high temperatures on a sunny day, under conditions of high intensity of radiation, water evaporation from short grass is greater than from long grass. In contrast, with lower temperatures more water is lost from the long grass.

Wind velocities and other factors, such as the physical structure of the grass, will also influence the rate of water evaporation, the scientists report in *Nature* (June 7).

Science News Letter, June 21, 1958

CE FIELDS

PUBLIC HEALTH

Data Points to Passive Transfer of Tumor Fighter

► AN ANTI-CANCER factor may be circulating throughout the body in a manner similar to antibodies.

A recent study of the passive transfer of anti-tumor factors through the milk of rats indicates these factors may act much as the germ fighters which immunize humans against disease. B. Sekla of the medical faculty, Charles University, department of general biology, Prague, Czechoslovakia, reports.

The investigator took newborn albino rats from their mothers. The "orphaned" baby rats were given for nursing to black rats which had been previously immunized against tumors. The offspring of the black rats were given to the albino mothers. A control group of newborn albino rats were kept with their mothers.

The baby rats of both the control and the switched groups received, by injection subcutaneously, equal doses of live tumor cells.

The results of this experiment showed those albino tumor-prone offspring which nursed with the black, immunized mothers, developed tumors within 20 days in a ratio of 5 to 11. Those black, immune offspring that nursed with the albino, tumor-prone mother rats, developed tumors within 20 days in a ratio of three to seven. The control group of albino, tumor-prone offspring which nursed from their own mothers, developed tumors in a ratio of nine to nine.

Results of another experiment showed albino, tumor-prone rats, when left to nurse with their own mothers that had received shots of immunizing serum, did not develop tumors at as great a rate as those offspring nursing with their unimmunized mothers.

These results closely parallel the findings by other scientists that bacterial antibodies can be transferred through milk to sucklings, the scientist states in *Nature* (June 7).

Science News Letter, June 21, 1958

EDUCATION

Math Teachers Go Back to School

► HIGH SCHOOL mathematics teachers in New York City are going back to school on "company time and at company expense."

Starting this fall, 600 teachers in the metropolitan area will receive time off during the school year to learn the "newer concepts of mathematics." The cost will be borne by the schools.

The learn-and-earn plan was adopted by superintendents of schools of the Metropolitan School Study Council, an affiliate of the Institute of Administrative Research of Teachers College, Columbia University.

The back-to-school program is an outgrowth of suggestions on ways in which to improve mathematics teaching and interest more students in mathematics made by the Commission on Mathematics of the College Entrance Examination Board.

In addition to bringing teachers up-to-date in mathematics the Commission also would like to see the following done, according to Dr. Albert E. Meder, formerly director of the Commission and currently dean of administration and professor of mathematics at Rutgers University:

1. Eliminate the terms algebra, geometry and others and replace them with elementary, intermediate and advanced mathematics, that would be taught as part of mathematical structure, not just for "manipulative" value.

2. Cut down the number of theorems now being taught in geometry and add material for better understanding of spatial concepts.

Science News Letter, June 21, 1958

AERONAUTICS

Air Navigation System Helps Avoid Collisions

► AN AIR navigation system has been designed to simplify the problem of air traffic control and reduce the hazard of mid-air collisions.

Called the High Density Air Navigation (HIDAN) method of flight control, it includes fully automatic, self-contained navigational and control equipment to be carried in the airplane itself.

In this manner, pilots will have before them in the cockpit at all times a picture of the airplane's actual course in relation to its intended course. Thus, pilots can execute their prescribed flight programs to waypoints and destinations with precision, Edwin A. Link, president of General Precision Equipment Corporation, explained.

The HIDAN equipment has two main components.

One is an airborne, automatic navigator called RADAN, an 89-pound device that supplies continuous ground speed and drift angle data.

The other component of the system instantly indicates the position of the aircraft and, when programmed for a flight, continuously calculates the divergence of the actual position of the aircraft from its planned position.

If the pilot fails to stay on flight program or gets off his course, his HIDAN equipment immediately shows him what he must do to get back on plan.

As the number of airplanes in flight increases substantially, the shortage of airspace will become more acute, especially in the areas around major terminals such as New York, Chicago and Los Angeles, Mr. Link pointed out.

This will result in more costly delays and more hazardous crowding until the new Airways Modernization Board system, including navigation methods such as HIDAN, goes into operation.

Science News Letter, June 21, 1958

ENDOCRINOLOGY

"Chemical Armor" For Pituitary Hormone

► AS PROTECTION against enzymes which might destroy them during routine tours of duty in the body, hormones of the pituitary gland may have a sort of "chemical armor."

Such is the implication of research by Dr. Jessamine Hilliard of the University of California at Los Angeles Medical School. Dr. Hilliard reports some of her findings in *Endocrinology*.

The "chemical armor" consists of a substance which inhibits the digestive activity of the enzyme pepsin. It was isolated in extracts from the pituitary gland.

Experiments indicate the pepsin inhibitor, although apparently associated with the pituitary hormone, is not directly involved in hormonal activity.

The hypothesis that the substance functions as a protective armor against a protein-attacking enzyme, probably pepsin, is based upon the fact that all known pituitary hormones are protein in nature. Thus they would be subject to destruction by such enzymes if not protected.

A similar type of "chemical armor" is found on the parasitic roundworm, *Ascaris*, Dr. Hilliard points out. The function there is to prevent the worm from being digested by pepsin in the host's gastric juice.

Science News Letter, June 21, 1958

EUGENICS

America Has Double Pattern of Marriage

► AMERICA has a double standard when it comes to marriage. The majority marry once and stay married until "death do us part." But a sizable minority practice a kind of polygamy within the law; they have mate after mate, although not more than one at a time.

This conclusion, reported by Thomas P. Monahan of the Philadelphia Municipal Court in *Eugenics Quarterly* (June), is based on a study of marriage statistics in Iowa. Iowa, a fairly representative area in the American Midwest, is one of only two or three states that gather records showing the previous marital status of couples entering into marriage.

Of 100 marriages of previously unmarried persons, only 16.6 end in divorce within a three-year period, Mr. Monahan reports. But where both parties had been divorced once before, the divorce figure doubles to 34.9 per 100 marriages. Where both parties had been divorced twice or more times before, the ratio climbs to 79.4 per 100. This group is what Mr. Monahan calls the "divorce-prone."

The ratio is much lower for the previously widowed. It is only 9.9 when both parties were widowed once only, and only 2.0 when both were widowed twice or more.

"We are, in effect, operating a type of trial marriage system," Mr. Monahan comments.

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